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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/864,208	05/25/2001	Norio Kimura	2001_0660A	1632

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EXAMINER
MACARTHUR, SYLVIA

ART UNIT	PAPER NUMBER
1763	5

DATE MAILED: 06/26/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/864,208	KIMURA ET AL.	
	Examiner	Art Unit	
	Sylvia R MacArthur	1763	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *25 May 2001* .

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-13* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-13* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *25 May 2001* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11)☐ The proposed drawing correction filed on _____ is: a)☐ approved b)☐ disapproved by the Examiner.

If approved, corrected drawings are required in reply to this Office action.

12)☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

13)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____ .

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

14)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).

a) ☐ The translation of the foreign language provisional application has been received.

15)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____ .
4) ☐ Interview Summary (PTO-413) Paper No(s). _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: .

DETAILED ACTION

Claim Rejections - 35 USC § 112

1. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

2. Claim 5 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. Specifically, applicants cite that the pH is on the same side as pH 7. This statement is unclear, if the pH of the liquid is 7 that is the liquid (neutral, e.g. water) or is the pH above 7 (basic, e.g. ammonia).

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

4. Claims 1, 4, 6, and 8 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kimura et al (US 6,077,385) in view of Suzuki (US 6,332,832).

Kimura et al teaches a polishing apparatus comprising a turntable 5 (polishing table) and a top ring 1. Kimura further teaches a top ring motor able to control speed of rotation of top ring relative to polishing tank (relative movement changing mechanism) and a top ring air cylinder 10 which is operated to press the top ring downward toward the turntable 5. According to col. 8 line

65-col. 9 line 16, regulator (pressing force changing mechanism) R1 changes or controls the force F1 applied to the top ring to press the wafer 4 against the polishing cloth 6.

Kimura fails to teach a control mechanism as recited in claim 1 of the claimed invention.

Suzuki teaches a CMP processing apparatus with polishing portions of two or more types that have different conditions of contact with the work. Suzuki teaches a vertical motion drive mechanism 6, which is adapted to adjust to the force used to press the wafer W against polish pad 3. The vertical motion drive mechanism and control unit 10 combined read upon the control mechanism of claim 1 of the present invention. According to col.5 lines 12-29, polishing of the wafer W surface by both the first polishing portions 41 and the second polishing portions 42 (rough polish) and polishing of the wafer W surface by the second polishing portions 42 (fine polish).

The motivation to modify the apparatus of Kimura to provide for the control mechanism of Suzuki is that as stated in col. 5 lines 31-36 the teachings allow for multiple polishing states without changing the polish pad (polishing table). This also reduces the footprint of the polishing apparatus.

Thus, it would have been obvious for one of ordinary skill in the art at the time of the claimed invention to modify the apparatus of Kimura to provide for the control mechanism of Suzuki

Regarding claim 4, the polishing processes (fine and rough) of Suzuki occur on the same polishing table in that pad 3 comprises both the first and second polishing portions.

Regarding claim 6, Suzuki cites that pad 3 comprises fixed abrasive particles both rough and fine use polishing portion 42, (same abrasive grain) according to col. 5 lines 12-29.

Regarding claim 8, Suzuki is obviously capable of comprising at least three polishing processes. According to the abstract, Suzuki states the pad has two or more polishing portions.

Additionally, the number of polishing portions is an art recognizable optimizable parameter such that one of ordinary skill in the art of polishing semiconductors would choose the number of polishing processes and polishing portions that would ensure the desired polishing result.

5. Claim 2, 3, 7, 9, and 13 is rejected under 35 U.S.C. 103(a) as being unpatentable over Kimura in view of Suzuki as applied to claims 1, 4, 6, and 8 above, and further in view of Ishikawa et al (US 6,431,949).

The teachings of Kimura and Suzuki were discuss above.

Regarding claims 2 and 9, both fail to teach a thickness detection means.

Ishikawa teaches a thickness measurement gage (not shown) as cited in col. 4 lines 3.

Ishikawa teaches that the motivation of providing such thickness determining means is that the results of thickness measurement determine which type of polishing is appropriate for the substrate--rough or fine polishing.

Thus, it would have been obvious for one of ordinary skill in the art at the time of the claimed invention to modify the apparatus of Kimura and Suzuki to include a thickness detecting means as taught by Ishikawa.

Regarding claims 3, 7, and 13 both fail to teach cleaning the polishing table between polishing processes.

Ishikawa teaches a dressing board 29 (dressing means) that cleans the polishing table after rough or fine polishing. Controller 90 controls the dressing board. This controller also executes the rough and fine processing steps.

Thus, it would have been obvious for one of ordinary skill in the art at the time of the claimed invention to modify the apparatus resulting from the combined teachings of Kimura and Suzuki to include a dressing means as presented by Ishikawa to keep the polishing table clean.

6. Claim 10 is rejected under 35 U.S.C. 103(a) as being unpatentable over Kimura in view of Suzuki as applied to claims 1, 4, 6, and 8 above, and further in view Nyui et al (US 6,503,361).

The teachings of Kimura and Suzuki were discussed above.

Both fail to teach a water polishing process.

Nyui teaches a water supply nozzle for the supply of water to discharge water onto the substrate.

The motivation to introduce a water polishing step in the process resulting from the combined teachings of Kimura and Suzuki are that water polishing step is used to eliminate any slurry, dust, etc. adhering to the substrate after the prior polishing steps..

Thus, it would have been obvious for one of ordinary skill in the art at the time of the claimed invention to introduce the water polishing to ensure the cleanliness of the wafer after prior polishing steps.

7. Claim11 is rejected under 35 U.S.C. 103(a) as being unpatentable over Kimura, Suzuki, and Nyui as applied to claim 10 above, and further in view of Lim (US 3,855,024).

The teachings of Kimura, Suzuki, and Nyui were discussed above.

All fail to teach an atomizer polishing process.

Lim teaches a method of contacting a substrate with a gaseous mixture of carrier gas (inert gas) and water.

Lim teaches that the motivation to provide for the gaseous mixture as a polishing agent is that it provides for the elimination of impurities from abrasives. Additionally, Lim cites that the gaseous phase process provides for the removal of impurities.

Thus, it would have been obvious for one of ordinary skill in the art at the time of the claimed invention to an atomizer polishing process as discussed in Lim in the water polishing process resulting from the combined teachings of Kimura, Suzuki, and Nyui.

8. Claim12 is rejected under 35 U.S.C. 103(a) as being unpatentable over Kimura and Suzuki as applied to claims 1, 4, 6, and 8 above, and further in view of Suzuki et al (US 6,562,695) also known as Suzuki '695.

The teachings of Kimura and Suzuki were discussed above.

Both fail to teach the plurality of films laminated upon the substrate as discussed in claim 12 of the present invention.

Suzuki illustrates a wafer, as shown in FIG. 6, a silicon oxide film 25 (oxidation layer) is formed over the information storage capacitor element C, followed by etching the silicon oxide film 25 at the peripheral circuit portion and lower insulating films (including a silicon oxide film 19, silicon nitride film 18 and silicon oxide film 17) to form a through-hole 24 and forming a plug 28 in the through-hole 24. The plug 28 in the through-hole 24 is formed by successively depositing a barrier metal film (TiN film/Ti film) 28a and a W film 28b on the silicon oxide film 25 including the inner surfaces of the through-hole 24 and removing the W film 28B

from the upper portion of the silicon oxide film 25 by etching.

The motivation to modify the substrate of Kimura and Suzuki to include the oxidation, Ti, TiN, and W layers is to provide a substrate with an epitaxial structure that will produce the desired electrical properties.

Thus, it would have been obvious for one of ordinary skill in the art at the time of the claimed invention to modify the substrate of Kimura and Suzuki to include the oxidation, Ti, TiN, and W layers of Suzuki '695.

Conclusion

9. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Sylvia R MacArthur whose telephone number is 703-306-5690. The examiner can normally be reached on M-F during the core hours of 8 a.m. and 2 p.m.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Gregory L. Mills can be reached on 703-308-1633. The fax phone numbers for the organization where this application or proceeding is assigned are 703-872-9630 for regular communications and 703-872-9630 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-308-0661.

Sylvia R MacArthur
Patent Examiner
Art Unit 1763

June 24, 2003